# Cost-Benefit Estimates From Prevention Research

Substance Abuse and Mental Health Services Administration

SAMHSA

CSAP Center for Substance Abuse Prevention

NPN Conference Edition

# Acknowledgements

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Task Order: 283-98-9014

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# Summary

As a result of substance abuse, society paid a total societal cost of $428 billion in 1995 (Rice, 1999). This $428 billion cost estimate includes alcohol, tobacco, and illicit drug abuse and is a cost of approximately $1,600 for every man, woman, and child in the United States. Direct federal costs from Medicare, Medicaid, veteran's health, and other employee benefits was $61 billion of the total substance abuse costs in 1995. It would clearly be to the benefit of society to prevent problems related to substance abuse before they result in these enormous economic costs. The primary purpose of this paper is to present the federal and total economic costs related to substance abuse as well as the actual and estimated cost-benefit ratios from the literature.

At the time of this paper, there were seven cost-benefit estimates in the literature based on prevention programs that reported cost-benefit ratios ranging from $1:2 to $1:19.64. The seven cost-benefit estimates available in the literature indicate that prevention is consistently cost-beneficial. The variability in the cost-benefits estimates is related to the costs included, time period of accrued benefits, number of outcomes included, and the use of discounted dollars. Regardless of these positive results, there is a need to develop more cost-benefit estimates for the field of prevention.

# I. INTRODUCTION

Abuse of alcohol and the use of tobacco and illicit drugs cost American society approximately $428 billion in 1995 (Rice, 1999). This translates into an average of $1,600 for every man, woman, and child in the United States.

Components of social costs include:

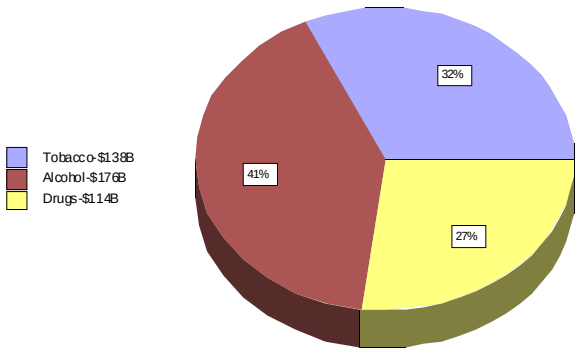
- Substance abuse treatment, other healthcare, and related expenses;
- Criminal justice and victimization costs from crime; and
- Lost wages, production, and taxes resulting from injury and premature death.

As shown in Exhibit 1, total societal costs are $428 billion, and alcohol-related problems account for 41 percent or $176 billion of total economic costs, while tobacco accounts for 32 percent ($138 billion) and illicit drugs accounts for about 27 percent ($114 billion). These costs are only slightly offset by the revenues received from taxes on tobacco and alcohol.

**Exhibit 1**
**1995 TOTAL SOCIAL COSTS—$428 BILLION**

Substance abuse is a significant factor driving the spiraling costs of the healthcare system. In 1996, Americans spent $1 trillion on direct costs of healthcare (Cummings, 2001). Rice (1999) estimates the 1995 direct healthcare costs for alcohol, tobacco, and illicit drugs at $114 billion or 11.4 percent of all healthcare costs.

Exhibit 2 presents direct federal health and disability expenditures related to tobacco, alcohol, and other drugs. These expenditures were estimated at $61 billion in 1995 (Merrill and Fox, 1995), $39 billion (65%) of the $61 billion in expenditures was related to tobacco. Alcohol accounted for $12 billion (19%) and illicit drugs accounted for $10 billion (16%) of federal dollars spent on substance abuse-related Medicare, Medicaid, veteran's benefits, and employee health insurance claims.



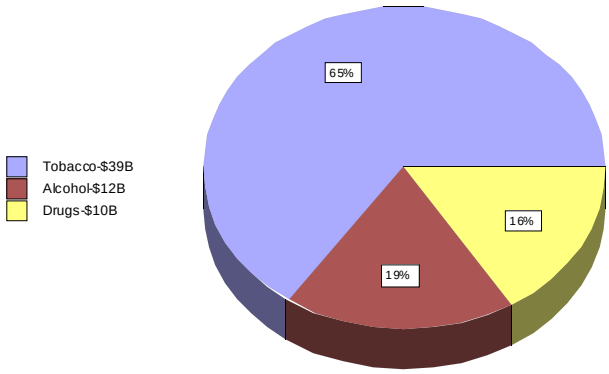
Cohen (1998) estimates the savings resulting from helping just one high-risk youth to graduate from high school, avoid heavy drug use, and not engage in crime would range between $1.7 and $2.3 million. The savings for abstinence of heavy drug use alone fall between $370,000 and $970,000. Because of the high economic costs per individual, Cohen estimates that prevention programs need to succeed with only a few participants to be cost-beneficial.

## Purpose and Scope of this Analysis

Economists working with the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) have studied extensively the cost-benefit of prevention of alcohol abuse and teenage smoking. Prime examples of this work include the National Bureau of Economic Research study on the preventive effects of excise taxes and legal drinking ages (1987) and the Chaloupka and Grossman (1996) study for CDC on youth response to tobacco control policies. Most published studies, however, examine the cost-benefit of prevention-related policy and regulatory change. Research on the costs and benefits of well-known prevention services such as school-based substance abuse education, parent outreach and training, and community anti-drug coalitions has been much less frequently funded or published. As shown in Exhibit 3, significant gaps exist in the research base that demand resolution through additional cost-benefit estimate studies.

At the time of this paper, seven estimates applied to such prevention services in the published literature and they report cost-benefit ratios ranging from 1:2 to 1:19.64 (see Appendix A). In other words, as shown in Exhibits 3 and 4, savings from $2.00 to nearly $20.00 accrued for every $1.00 spent on these programs. Exhibit 3 summarizes these ratios within the types of prevention programs and their short-term or long-term benefits. The primary difference in the estimates was the time period under consideration, with the highest estimate based on lifetime savings and the lowest estimate limited to a 5-year period. Additional factors that influence the ratio included the costs ascribed to the program, the types of outcomes included in determining benefits, and differences in economic methodologies.

**Exhibit 2**
**1995 ECONOMIC COSTS TO FEDERAL HEALTH ENTITLEMENT PROGRAMS**

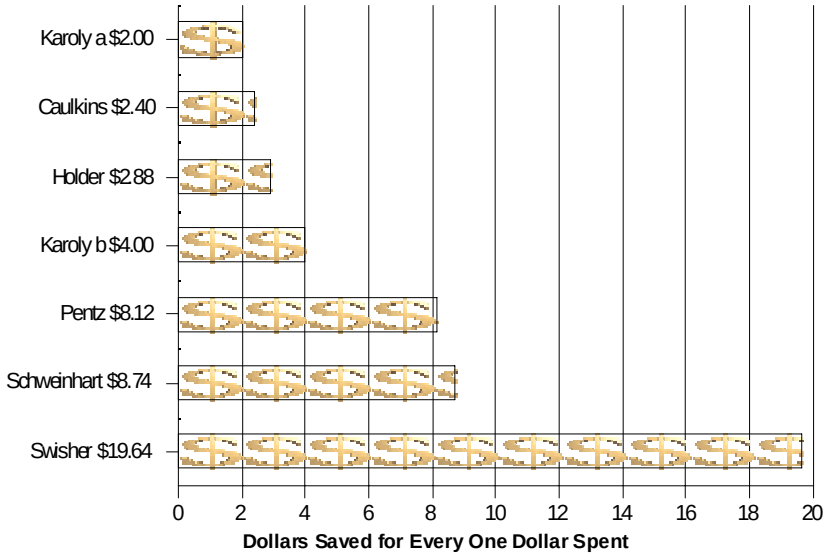


This paper focuses on the cost-benefit ratios reported from existing research on such prevention services, consisting of five programs described briefly in Appendix B. Analyses compared the highly disparate cost-benefits estimates in the literature. As a result, the paper also addresses the variability among estimates resulting from different assumptions regarding costs and benefits. The paper concludes with recommendations resulting from these analyses. It is important to note that cost-benefit ratios are only one criterion for judging the success of prevention.

## Exhibit 3
## CLASSIFICATION OF PREVENTION STUDIES HIGHLIGHTED IN THIS PAPER

| Source | Population | Universal | Selective | Indicated | Comprehensive | Cost: Benefit Ratios |
|---|---|---|---|---|---|---|
| **Caulkins, et al. (1999)** | Middle school | X | | | | 1:2.40 |
| **Holder (2000)** | Community | | | | X | 1:2.88 |
| **Karoly, et al. (1998a)** | Preschool | | X | | | 1:2.00 |
| **Karoly, et al. (1998b)** | Prenatal | | X | | | 1:4.00 |
| **Pentz, (1995)** | Middle school | X | | | | 1:8.12 |
| **Schweinhart, et al. (1993)** | Families | | X | | | 1:8.74 |
| **Swisher, (2001)** | Middle school | X | | | | 1:19.64 |

## Exhibit 4
## DOLLARS SAVED IN COST-BENEFIT ESTIMATES



# II. CLASSIFICATION OF PREVENTION PROGRAMS

The programs that provide the basis for cost-benefit estimates can be classified under the Institute of Medicine (IOM) categories of universal, selective, and indicated prevention:

- Universal prevention services are provided to all individuals in a school, agency, worksite, or community, regardless of their individual characteristics.
- Selective prevention services are designed for individuals who display a characteristic that places them at an above average risk for the development of substance abuse. These characteristics include mental health or behavioral problems, residence in a household with active drug users, problems in social interaction, involvement with juvenile or criminal justice, homelessness, and school failure or frequent work absences. Typically, selective prevention services are more intensive than universal prevention services.
- Indicated prevention services focus on individuals who exhibit the early signs or symptoms of substance abuse, such as frequent intoxication or repeat alcohol-impaired driving convictions among adults, and occasional tobacco, alcohol, or drug use among adolescents and children. These services often take the form of a "brief intervention" with many of the features of treatment.

An additional category of "comprehensive" prevention programs reflects programs that combine universal, selective, and indicated elements.

The IOM categories assume that services are delivered directly to individuals. "Environmental" prevention, in contrast, indirectly affects individuals by modifying community norms, policies, and practices. The establishment of a community drug prevention task force, for example, represents an "environmental" activity that attempts to strengthen community anti-drug norms in addition to any specific services that the task force may provide to individuals.

Exhibit 3 illustrates the division of prevention services in the seven studies highlighted in this analysis by the categories of universal, selective, and comprehensive. No cost-benefit studies have been conducted for the relatively high-intensity prevention services for indicated individuals, although such data could be derived from the multi-nation World Health Organization test of brief interventions for alcohol abuse.

Exhibit 4 presents a graphic summary of the cost-benefit ratios from the literature beginning with the lowest and ending with the highest estimate. The components differ across studies, making averaging and direct comparison difficult. Using multiple indicators, varied cost elements, and different program strategies, every study consistently found benefits to outweigh costs by at least 2 to 1.

# III. COST COMPONENTS OF PREVENTION

The cost-benefit estimates identified among the eight studies were based on actual costs. As shown in Exhibit 5, several cost elements were used to arrive at the cost per participant including training, implementation, time value for participants, facilities, length of program, development and evaluation, and contributions. Pentz (1995) used very detailed approximations in the cost estimates and actually included the original development and evaluation costs. In practice, the initial development and evaluation costs of prevention would be amortized over time across new populations using the materials. As a result, the cost-benefit ratios in Pentz should be viewed as conservative, and without the development and evaluation costs, the ratios would increase substantially.

**Exhibit 5**
**COST FACTORS IN CALCULATING PROGRAM COSTS**

| | Training | Implementation | Participant Time | Facilities | Multi-year | Development and Evaluation | Contributions |
|---|---|---|---|---|---|---|---|
| **Caulkins** | X | X | X | | X | | X |
| **Schweinhart** | | X | | X | X | | |
| **Holder** | | X | | X | X | | |
| **Karoly a** | X | X | | | X | | |
| **Karoly b** | X | X | | | X | | |
| **Pentz** | X | X | | | X | X | X |
| **Swisher** | X | X | X | X | X | | X |

Swisher (2001) and Caulkins et al. (1999) offered estimates that incorporated time value of participants, which include the lost opportunity potentially forfeited to participate in a program. For example, if parents participate in a program, they forego the opportunity to earn income while attending the program. Although a technique known as a "willingness-to-pay" model can be used as a substitute for opportunity costs, none of the other studies used this approach.

All of the cost-benefit studies reportedly incorporated implementation costs, but it is not possible at this time to ascertain differences in how implementation costs are calculated among cost-benefit studies. Use of facility costs was incorporated in the cost-benefit analyses of Holder (2000), Schweinhart (1993), and Swisher (2001) but was not explicitly defined in some of the reports.

Contributions were reported by Pentz (1995), Swisher (2001), and Caulkins et al. (1999) and included additional sources of revenues from private foundations and participants. Program development and evaluation costs were included by Pentz (1995). Pentz's (1995) development costs could be eliminated in replications that would not involve new development efforts.

# IV. OUTCOMES STUDIED

The variety of outcomes used to calculate economic savings proved to be a powerful influence on the benefit side of a cost-benefit equation. Ratios are higher when more variables are included in the savings side of the equation. Caulkins et al. (1999), for example, based their estimates only on cocaine short-term savings related to reduced criminal justice costs. If Caulkins et al. (1999) had included reductions in tobacco, alcohol, and marijuana use reported by the programs involved, the savings would have increased dramatically.

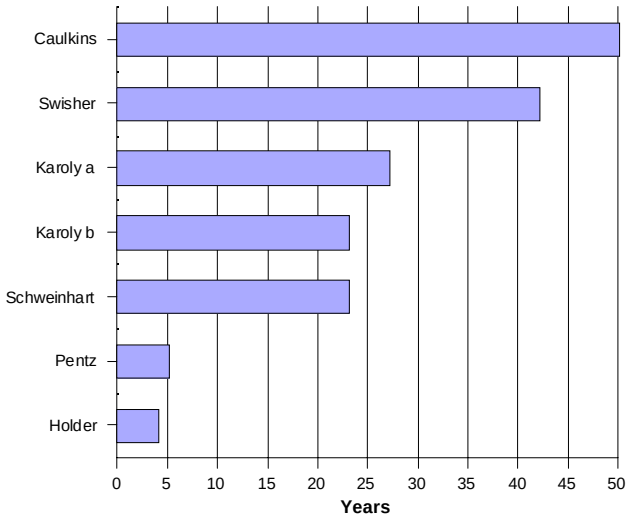
As shown in Exhibit 6, some of the estimates were based on delayed onset or lower levels of use of alcohol, tobacco, and illicit drugs compared to control groups while others were based on related risk and protective factors, such as increased schooling or reduced welfare.

The time period used to calculate benefits, as well as the type of benefit, affects the magnitude of cost-benefits reported from prevention research. The eight studies included in this analysis calculated the benefits for periods ranging from 5 years to a normal lifetime. Exhibit 7 presents the distribution of time frames used to calculate benefits. For example, Holder (2000) based his estimate on a period of 4 years, while Swisher (2001) based his ratio on lifetime healthcare costs associated with reduced number of smokers.

**Exhibit 6**
**TYPES OF OUTCOMES FOR SAVINGS**

| | Tobacco | Alcohol/ Crashes | Illicit Drugs | Wages | Welfare | Education | Crime | Victims |
|---|---|---|---|---|---|---|---|---|
| **Caulkins** | | | X | | | | X | |
| **Schweinhart** | | | | X | X | X | X | X |
| **Holder** | | X | | | | | | |
| **Karoly a** | | | | X | X | X | X | |
| **Karoly b** | | | | X | X | X | X | |
| **Pentz** | X | | | | | | | |
| **Swisher** | X | | | | | | | |

**Exhibit 7**
**TIME PERIOD FOR CALCULATING SAVINGS**



# V. ECONOMIC BENEFITS

The components of social costs in the literature for this paper included reduced demand for substance abuse treatment and healthcare, reduced levels of crime, less need for welfare, greater employment, greater advancement in schooling, and fewer alcohol-related crashes. Kim (1995) and Caulkins et al. (1999) used total social costs (Rice, 1999) as the basis for their cost avoidance while the other studies were able to estimate cost reductions directly from available data in the communities (e.g., Pentz, 1995).

**Exhibit 8**
**DIFFERENCES IN METHODOLOGIES**

| | Actual | Hypothetical | Multiple Estimates | All or Affected Participants |
|---|---|---|---|---|
| **Caulkins** | | X | X | Affected |
| **Schweinhart** | X | | | All |
| **Holder** | X | | | Affected |
| **Karoly a** | X | | X | All |
| **Karoly b** | X | | X | All |
| **Pentz** | X | | | Both |
| **Swisher** | | X | | Affected |

Definition of cost components and outcomes are not the only sources of variation in cost-benefit measurement. Assumptions incorporated in the study design also have a profound impact on the ability to make direct comparison across cost-benefit studies. For example, studying individual participants in prevention allows researchers to examine actual health costs from various records and use these as the basis for the estimates. As shown in Exhibit 8, Holder (2000), Karoly et al. (1998), and Schweinhart et al. (1993) used this preferred method of following individuals over time compared to a control group. However, it is very difficult to include multiple variables and the research costs also are considerably greater. Caulkins et al. (1999) and Swisher (2001) estimates were hypothetical scenarios but based the outcomes from studies in the literature.

Caulkins et al. (1999) projected multiple estimates (sensitivity analysis) and took the mean of these projections. Multiple estimates also were used in both studies by Karoly et al. (1998), despite data collection from followup of individuals. This complicates the comparison process by effectively dividing the seven studies among four distinctly different methodologies for data collection.

Exhibit 8 further indicates that most of the studies allocated prevention costs among all individuals who received prevention services; Caulkins et al. (1999), Holder (2000), and Swisher (2001) attached costs only to those affected by the program. The costs are higher per program participant when the costs are divided by only those individuals who benefit or were affected by a program rather than by all who participated in a program.

In general, more comprehensive cost and benefit elements and a longer time period with actual program participants results in a greater confidence in the outcomes. However, most government grants are for considerably shorter periods of time and benefit calculations require greater periods of time to accrue. Other economic issues, such as adjustments for discounted dollars, were not discussed in the various studies, which made it difficult to fully understand the basis for any given estimate. These limitations notwithstanding, the evidence on the cost-benefit of prevention services can be summarized as follows:

- Caulkins et al. (1999) estimated benefits of a universal prevention program to be a savings of $2.40, based on fewer cocaine users, for every $1.00 spent.
- Holder (2000) reported benefits of a universal prevention program (increased drinking age) to be $2.88 in savings for every $1.00 spent based on fewer crashes.
- Karoly et al. (1998) reported on the benefits for both the Perry Preschool Project and the Elmira Prenatal Early Infant Program. Their cost-benefit estimate for the Perry Preschool Project was a savings of $2.00 for every $1.00 spent; for the Elmira Prenatal Early Infant Program a savings of $4.00 resulted from every $1.00 invested based on reduced crime and welfare, and on increased earnings and education.
- Pentz (1995) reported benefits of a universal tobacco prevention program to be for every $1.00 spent a savings of $8.12 was realized, based on reduced demand for social services.
- Schweinhart et al. (1993) reported the benefits of a selective prevention program (an intensive set of services for families) to be for every $1.00 spent a savings of $8.74 resulted (Perry Preschool Project) based on reduced crime, welfare, and victims of crime, and on increased levels of earnings and education.
- Swisher (2001) estimated the lifetime benefits of a universal program that reduced the number of pack-a-day tobacco smokers to be $19.64 for every $1.00 spent, based on reduced health-care costs.

# APPENDIX A

## Cost-Benefit Estimate Abstracts

# COST-BENEFIT ESTIMATE ABSTRACTS

This appendix presents abstracts for each study reported in this overview. A description for each study is provided in addition to an explanation regarding the derivation of the cost-benefit ratios. Each abstract includes a brief description of the program, the outcomes measured, the basis for calculating costs and benefits, and comments on methodologies, as well as a general critique. The reader is encouraged to seek out the original references for greater detail regarding any particular study.

**Caulkins et al. (1999)** estimated the savings to society resulting from a reduction in cocaine use. This analysis combined the average reduction in marijuana use achieved by two prevention programs and extrapolated the average reduction in cocaine use based on the percentage of marijuana users who also use cocaine. The two prevention programs that served as the basis for this study included ALERT and Life Skills Training, neither of which emphasize cocaine in their lessons.

**Program:** ALERT (Elickson et al., 1995) and Life Skills Training (Botvin et al., 1995) are universal prevention programs offered at the middle/junior high school level. They consist of approximately 15 lessons in year one followed by booster sessions in subsequent years. The authors generated this estimate based on a hypothetical scenario of a nationwide implementation of these programs.

**Time:** The time period for this estimate was the lifetime reduction in cocaine use (50 years).

**Outcomes:** The outcomes for this analysis were an extrapolated level of cocaine use based on the relationship between marijuana use and cocaine use. The authors acknowledged that other outcomes, such as reduced alcohol or tobacco use, may have produced better results.

**Costs:** The costs was $150 per student and included teacher training and materials.

**Benefits:** The benefits result from reductions in crime and healthcare over the lifetime of the affected participants. The cost-benefit ratio was reported as $1:2.40.

**Methodology:**

The authors engaged in a series of mathematical computations in order to derive their reduction in cocaine estimates and in a series of low, middle, and high outcomes and associated benefits. They also compared the benefits to other drug control efforts such as interdiction and treatment. Other cost-benefit estimates were provided that ranged from $1:0.64 to $1:5.60.

**Critique:** The reliance on cocaine use as the outcome of ALERT or Life Skills Training is inconsistent with the goals of those programs. Furthermore, in the absence of actual use data for cocaine, the authors had to calculate levels of cocaine use based on its association with marijuana use that was available from the program outcome data. This methodology involved more assumptions than necessary.

**Source:** Caulkins et al., An Ounce of Prevention, a Pound of Uncertainty: The Cost-effectiveness of School-based Drug Prevention Programs, Santa Monica, CA: Rand Corporation, 1999.

**Holder (2000)** estimated the savings from injuries resulting from alcohol-related crashes in three communities. The benefits accrued over a 4-year period during which time a variety of community initiatives were implemented.

**Program:** The environmental programs implemented included community task forces, responsible beverage server training, increased drunk-driving enforcement, reduced availability to minors, and changes in local zoning to reduce access. The author based the cost-benefit estimate on actual data in three communities compared to similar control communities.

**Time:** The programs and evaluation took place during a 4-year period.

**Outcomes:** The research report focused on alcohol-related crashes and indicated that 78 fewer crashes occurred in the experimental communities compared to the control communities. Other outcomes related to specific program initiatives, such as reduced sales to minors, also were reported but not used to calculate costs and benefits.

**Costs:** The author based his calculations of costs of the program on the staffing costs related to implementing all of the program components. Volunteer time in community task forces, time of individuals being trained, costs of increased enforcement, and costs related to the research were not included.

**Benefits:** The author estimated the average cost of an alcohol-involved crash to be $39,905 based on medical, legal, and insurance costs, as well as lost wages but excluded premature death. The cost-benefit ratio was reported as $1:2.88.

**Methodology:**
The total costs for the program were charged against the 78 crashes.

**Critique:** More time and additional outcomes would have added to these cost-benefit estimates. Other costs, such as volunteer time, would have been more consistent with cost-benefit methodologies. This is a good example of the effectiveness of environmental strategies and their benefits.

**Source:** Holder, H.D., "Community Prevention of Alcohol Problems," Addictive Behaviors, 25(6), 929-942, 2000.

**Karoly et al. (1998)** reported on a 27-year followup of two programs with families that received special services. The authors based the savings on a range of outcomes including increased wages and taxes and reduced crime and welfare.

**Programs:** The two selective programs involved in this report included the Elmira Prenatal Early Infant Project (PEIP) and the Perry Preschool Project. The Elmira PEIP program provided parent education through home visitation by registered nurses to furnish parent education and linkage with healthcare providers. The participating parents were selected based on their highrisk for poor child and family outcomes. The Perry Preschool Project provided educational activities in a school setting for the children.

**Time:** The time period for these estimates was approximately 23 years for the Perry Preschool Project and 27 years for the Elmira PEIP.

**Outcomes:** The research reports many outcomes including cognitive development, child abuse, achievement, special education, graduation, crime, employment, welfare, substance abuse, and emergency room visits. The outcomes used in the cost savings calculations included increased wages and taxes and reduced crime and welfare.

**Costs:** All of the costs of the programs were accounted for, and the costs and benefits were discounted over time to account for inflation. The average costs per participant in the Elmira project were estimated to be approximately $6,000, and the costs of the Perry Preschool Project were estimated to be approximately $12,000.

**Benefits:** The authors based the benefits on actual reductions compared to control groups, and they were estimated to be $24,000 per family in the Elmira project and the Perry Preschool Project. The cost-benefit ratios were $1:4 for Elmira and $1:2 for Perry Preschool Project. A negative cost-beneficial ratio was reported for an intervention with lower-risk families in Elmira.

**Methodology:**
More conservative estimates resulted due to the discounting of benefit data over time.

**Critique:** These data are some of the most comprehensive cost-benefit ratios available. The extended period of time for following actual program participants is very unusual. The report is very objective and conservative in its calculations, and it includes a discussion of variability among programs. This analysis for the Perry Preschool Project did not include savings for victims of crime included in the estimate by Schweinhart et al. (1993). These data lend solid support as to the importance of beginning early in prevention.

**Source:** Karoly et al., Investing in Our Children: What We Know and Don't Know about the Costs and Benefits of Early Childhood Interventions, Santa Monica, CA: Rand Corporation, 1998.

**Pentz (1995)** reported cost-benefit ratios based on the 6-year results of Project STAR that was evaluated in 200 communities in two mid-western cities. Pentz (1995) calculated the savings by comparing the actual healthcare costs of program participants 6 years after the program with healthcare costs of comparison groups.

**Program:** The program consisted of a universal prevention program provided to 200 communities that included school curriculum, mass media, parent involvement, community task forces, and health policy changes. It began with junior high school age students and followed them and their families for 6 years.

**Time:** This study took place over a period of 5 years.

**Outcomes:** The research reports many outcomes such as lower levels of alcohol, tobacco, and marijuana use, but the benefit values reported were based only on the reduced number of daily cigarette smokers and their associated healthcare costs.

**Costs:** The study estimated the costs of the program to include development, implementation, and evaluation. The costs were $108 per adolescent and his/her family (n=23,500).

**Benefits:** The benefits are based on reduced need for counseling and treatment related to lower levels of daily cigarette smoking compared to a control group. The savings per adolescent and his/her family were $3,360. The cost-benefit ratio was reported as $1:8.12, indicating that for every $1.00 spent on the program, there was a savings of $8.12.

Other ratios reported for reduced monthly drunkenness and reduced heavy marijuana use ranged from zero savings to under $2.00 in savings.

**Methodology:**

This study consisted of an actual longitudinal analysis of reduced counseling and treatment needed by families of participants in Project Star (now a CSAP model program). The author reported a much higher ratio when calculating per affected family ($1:67.63). Pentz also included research and development costs that had the effect of increasing the program costs. These costs would not be incurred by someone replicating the program.

**Critique:** Including research and development costs in the calculation of total costs reduced the cost-benefit ratio and resulted in a more conservative estimate. This is one of the best available examples of actual data based on following program participants and their families over time.

**Source:** Pentz, M.A. (1995), "Costs, Benefits, and Cost Effectiveness of Comprehensive Drug Abuse Prevention," in W. Bukoski and R. Evans (eds.), Cost-benefit/Cost-effectiveness Research of Drug Abuse Prevention: Implications for Programming and Policy, Research Monograph Series, No. 176, pp. 111–129 Rockville, MD: National Institute on Drug Abuse.

**Swisher (2001)** estimated the healthcare savings based on reductions in smoking cigarettes in a hypothetical school of 1,000 students. The author derived the reductions in smoking from the 6-year results achieved by Botvin's (1995) Life Skills Training program and based the savings on the estimated healthcare costs for cigarette smokers.

**Program:** Life Skills Training is a universal prevention program consisting of 15 sessions that are begun in grade 6 or 7 and continued for 2 more years with booster sessions in each year. The author derived this cost-benefit estimate from existing data and applied to a hypothetical school building of 1,000 students.

**Time:** The time period for this estimate was based on approximately 40 years (assumed life expectancy for 18 year old cigarette smokers).

**Outcomes:** The research reports many outcomes such as lower levels of alcohol, tobacco, and marijuana use, but based the benefit values only on the reduced number of pack a day cigarette smokers and their probable healthcare costs.

**Costs:** The costs of the program were based on the training and materials costs for all 3 years of the program. All the costs were ascribed to the participants who benefitted from the program and the average costs per affected participant was $2,850.

**Benefits:** The author based the benefits on reduced need for healthcare over the lifetime of the affected participants who had reduced their smoking. The savings per affected participant were $56,000. The cost-benefit ratio was reported as $1:19.65

**Methodology:**

The total costs for all 1,000 students were charged against the 40 students who benefitted from the program by reducing their smoking behavior. The author reported other cost and cost-effectiveness estimates in the chapter for student assistance programs and for enhanced developmental skills.

**Critique:** The fact that it is a hypothetical scenario is the major limitation of this report. Other outcomes and their associated benefits would have provided additional cost-benefit ratios for this report. The costs were not inflated or discounted, which is a potentially controversial omission.

**Source:** Swisher, J.D. (2001), "Costs, Cost-effectiveness, and Cost-benefit of School and Community Counseling Services," in Locke, D.C.; Myers, J.E.; and Herr, E.L. (eds.), Handbook of Counseling. New York: Sage.

**Schweinhart et al. (1993)** followed high-risk families who had received preschool services 27 years earlier. The authors based the benefits of the Perry Preschool Project on increased wages and taxes and reduced welfare and crime.

**Program:** The Perry Preschool Project (selective) consisted of classroom activities and home visits. The schooling was comprehensive with a focus on language development and interaction between the child and teacher. The teachers visited the home of each child and helped the parent(s) reinforce the classroom activities.

**Time:** The time period of the study totaled 23 years, ranging from when the participants were age 4 through an average age of 27.

**Outcomes:** This program has been extensively studied at various times and the outcomes have included educational, interpersonal, and social development. The outcomes for this cost-benefit analysis after 27 years focused on societal savings related to crime, education, and welfare.

**Cost:** The cost per preschool child was taken as an average of the four groups in the program from 1962 through 1966. The average was discounted (inflated) to reflect costs at 1992 costs and estimated to be $12,356.

**Benefits**: The authors based the savings to society on reduced child care, increased schooling, wages, reduced welfare, reduced contact with the criminal justice system, and reduced costs to crime victims. The total societal benefit was estimated at $95,646, and the cost-benefit ratio was $1:7.7.

**Methodology:** The costs of the program were calculated as a per child cost and the ratio would have been higher if the total costs had been divided by the parents and the child.

**Critique:** This estimate and the one by Karoly et al. (1999) are the most comprehensive and cover the greatest time period for actual participants in a program. These data clearly indicate that an investment in prevention will provide significant returns to society.

**Source:** Schweinhart, L.J.; Barnes, H.V.; and Weikart, D.P. (1993), Significant Benefits: The High/scope Perry Preschool Study through Age 27, Ypsilanti, MI: High/Scope Educational Research Foundation.

# APPENDIX B

## Program Summaries

# PROGRAM SUMMARIES

This appendix describes the programs that served as the basis for many of the cost-benefit ratios in the text. Exhibit B-1 presents an overview of the programs used as the basis for the cost-benefit ratios by the principal author of this paper. Life Skills Training (LST) was used in two different estimates, and it should be noted the Perry Preschool Project and Elmira Preschool programs are very similar. ALERT, STAR, and LST are CSAP model programs that have shown considerable evidence of success in reducing use of alcohol, tobacco, and illicit drugs. Each of the programs involved in this review of cost-benefit ratios is briefly described below.

Holder (2000) based his cost-benefit estimate on three communities that engaged in a variety of strategies to reduce car crashes. These strategies included community mobilization of existing task forces and coalitions to provide leadership to the overall program. In addition, each community was encouraged to implement the following strategies:

- Training in responsible beverage service for merchants;
- Media and law enforcement activities that increased actual and perceived risk of detections for driving while intoxicated;
- Reducing access and sales to minors by enforcement of underage alcohol sales laws, training of merchants, and media advocacy to bring attention to the issue; and
- Reducing access by changing the locations and density of alcohol outlets.

**Exhibit B-1**
**PROGRAMS THAT WERE THE BASIS FOR COST-BENEFIT RATIOS**

| | MPP or STAR | Perry Preschool | Elmira Prenatal | LST | ALERT | Environmental |
|---|---|---|---|---|---|---|
| Pentz | X | | | | | |
| Caulkins | | | | X | X | |
| Swisher | | | | X | | |
| Holder | | | | | | X |
| Schweinhart | | X | | | | |
| Karoly a&b | | X[a] | X[b] | | | |

Holder (2000) found a reduction in car crashes in the three communities that implemented these types of environmental strategies compared to three communities that did not implement these strategies. The cost of each crash included health insurance and law enforcement costs, but not costs associated with death.

## Midwestern Prevention Project (MPP), a.k.a., STAR

Pentz et al. (1995) based their cost-benefit ratios on the Midwestern Prevention Project (MPP), which is a comprehensive, community-based, multifaceted program for adolescent drug abuse prevention. The MPP involves an extended period of programming. Although initiated in a school setting, it goes beyond this setting into the family and community contexts.

*Program Targets.* The MPP bridges the transition from early adolescence to middle through late adolescence. Since early adolescence is the first risk period for gateway drug use (e.g., alcohol, cigarettes, and marijuana), programming is initiated with whole populations of middle school (grade six or seven) students.

*Program Content.* The MPP strives to help youth recognize the tremendous social pressures to use drugs and provides training skills in how to avoid drug use and drug use situations. These skills are initially learned in the school program and reinforced through the parent, media, and community organization components.

*Program Outcomes.* Evaluations of the MPP have demonstrated for program youth, compared to control youth:

- Reductions of up to 40 percent in daily smoking;
- Similar reduction in marijuana use and smaller reductions in alcohol use maintained through grade 12;
- Effects on daily smoking, heavy marijuana use, and some hard drug use have been shown through early adulthood (age 23);
- Increased parent-child communications about drug use; and
- Facilitated development of prevention programs, activities, and services among community leaders.

*Program Costs.* There is a $175,000 minimal cost over a 3-year period (includes costs of teacher, parent, and community leader training and curriculum materials for school-based programs). Costs are based on up to 20 teachers trained in 1 group for the school program, 20 parent group members trained in 1 group for the parent program (about 3 to 4 principals, 4 student peer leader, and 12 parents), and 1,000 participating middle school students. Costs increase beyond this minimum approximately as follows: $4,000 per additional group trained on the same day or trip, $100–$125 per additional trainer manual, and $7.00 per additional student workbook.

## Life Skills Training

Swisher (2001) and Caulkins et al. (1999) based their cost-benefit ratios on more than a dozen studies consistently showing that the Life Skills Training (LST) program dramatically reduces tobacco, alcohol, and marijuana use. These studies further show that the program works with a diverse range of adolescents and produces results that are long-term and effective when taught by teachers, peer leaders, or health professionals.

*Program Targets.* LST is a primary intervention that targets all middle/junior high school students (initial intervention in grades six or seven, depending on the school structure, with booster sessions in the two subsequent years).

*Program Content.* LST is a 3-year intervention designed to prevent or reduce gateway drug use (e.g., tobacco, alcohol, and marijuana), primarily implemented in school classrooms by school teachers. The program is delivered in 15 sessions in year 1, 10 sessions in year 2, and 5 sessions in year 3. Sessions, which last an average of 45 minutes, can be delivered once a week or as an intensive mini-course. The program consists of three major components which teach students: 1) general self-management skills; 2) social skills; and 3) information and skills specifically related to drug use. Skills are taught using training techniques such as instruction, demonstration, feedback, reinforcement, and practice.

*Program Outcomes.* Using outcomes averaged across more than a dozen studies conducted with LST, it has been found to:

- Reduce tobacco, alcohol, and marijuana use 50 percent to 75 percent;
- Reduce polydrug use up to 66 percent;
- Reduce pack-a-day smoking by 25 percent; and
- Decrease use of inhalants, narcotics, and hallucinogens.

*Program Costs.* LST can be implemented at a cost of approximately $7.00 per student per year (curriculum materials averaged over the 3-year period). This does not include the cost of training, which is a minimum of $2,000 per day for 1 or 2 days.

## Perry Preschool Project

Schweinhart and Karoly et al. (1993) based their cost-benefit ratios on the Perry Preschool Project which provides high-quality early childhood education to disadvantaged children in order to improve their later school and life performances. The intervention combats the relationship between childhood poverty and school failure by promoting young children's intellectual, social, and physical development. By increasing academic success, the Perry Preschool Project is also able to improve employment opportunities and wages, as well as decrease crime, teenage pregnancy, and welfare use.

*Program Targets.* The program is aimed at low socioeconomic families who have children between 3 and 4 years old.

*Program Content.* The Perry Preschool Project is a 2-year intervention that operates 2.5 hours per day, 5 days per week, for 7 months per year, and includes weekly home visitations by teachers. Its success is largely due to the following components:

- A developmentally appropriate curriculum that views children as active, self-initiated learners;
- Small classrooms of 20 children and at least 2 staff, which allows for a more supervised and supportive learning environment;
- Staff who are trained in early childhood development and education, who receive supervision and on-going instruction, and who actively communicate with parents;
- Sensitivity to the noneducational needs of disadvantaged children and their families, which includes providing meals and recommending other social service agencies; and
- Ongoing monitoring and evaluation of both teachers' activities and children's behaviors and development.

*Program Outcomes.* Evaluations have demonstrated a wide range of successful outcomes for Perry Preschool Project children, compared to those who did not receive intervention, including:

- Less delinquency, including less contact with juvenile justice officials, fewer arrests at age 19, and less involvement in serious fights, gang fights, causing injuries, and police contact;
- Less antisocial behavior and misconduct during elementary school and at age 15;
- Higher academic achievement, including higher scores on standardized tests of intellectual ability and higher high school grades;
- Fewer school dropouts at age 19 (33% vs. 51%) and higher rates of high school graduation;
- Greater commitment to school and more favorable attitudes about high school;
- Higher rates of employment (50% vs. 32%) and pay and greater job satisfaction;
- Greater economic independence and less reliance on public assistance, including welfare usage; and
- Fewer pregnancies and births for women at age 19.

## The Elmira Prenatal Early Infancy Project

Karoly et al. (1998) based their cost-benefit estimates on the Elmira Prenatal Early Infancy Project (Elmira PEIP). This project provided intensive prenatal services including home visitation to women who were pregnant for the first time.

*Program Targets*. The authors recruited 500 economically disadvantaged first-time mothers between 1978 and 1980 in Elmira, New York. These women were thought to be at high-risk for poor child and family outcomes.

*Program Content*. Pregnant women received home visits during pregnancy and up until the child is age 2. The home visits were done by registered nurses trained in parent education, methods of involving family and friends in assisting and supporting the mother, and the coordination of related health and social services. On average, 9 home visits occurred during pregnancy and 23 visits occurred during the child's first 2 years.

*Program Outcomes*. The study found significant short- and long-term advantages for both the mothers and their children in the project. These results included:

- Less cigarette use during pregnancy;
- Better nutrition during pregnancy;
- More social support provided during pregnancy;
- Higher birth weights;
- Fewer acts of child abuse and neglect;
- Less use of food stamps;
- Less criminal activity by mothers; and
- More months employed.

*Program Costs*. The total per child program costs were $12,148 (in 1996 dollars). These costs would be slightly higher today due to inflation. These costs included the administration and nursing and related healthcare costs.

## Project ALERT

The other project in Caulkins et al. (1998) cost-benefit ratios is project ALERT (Ellickson and Bell, 1990) that was developed by the RAND Corporation of Santa Monica, California, with extensive support from the Conrad Hilton Foundation.

*Program Targets*. Project ALERT serves middle school children to establish no-drug-use norms, develop reasons not to use drugs, and resist pro-drug pressures. It focuses on the substances that adolescents use first and most widely: alcohol, tobacco, marijuana, and inhalants. Project ALERT is highly effective with middle school adolescents aged 11 to 14 years from widely divergent backgrounds and communities. It has been successful with high- and low-risk youth from urban, suburban, and rural communities, with youth from different socioeconomic levels; and with white, black, Latino, and Asian-American youth.

*Program Content*. Project ALERT uses a 14-lesson curriculum, participatory activities, and videos. Guided classroom discussions and small group activities stimulate peer interaction and challenge students, while intensive role-playing encourages students to practice and master resistence skills. Parent-involved homework assignments extend the learning process for participants.

*Results*. Project ALERT has dramatically reduced the onset of substance use, as well as regular use of drugs among young people. The program findings include:

- A 30 percent reduction in initial marijuana use and 25 to 50 percent reductions in heavy tobacco use, and
- A reduction of marijuana use initiation by 30 percent and a decrease in current and heavy smoking by 25 to 50 percent (for participants compared with control groups).

*Program Costs*. Project ALERT does not charge for materials but there is a cost of $125 per teacher trained. The training is currently subsidized by the Conrad Hilton Foundation. Teachers receive all materials necessary to implement the program including posters, student manuals, and videos. Technical assistance is provided, and an annual updating service is part of the training fee.

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